MONITORING PLAN

PROJECT NO. TE-22
POINT AU FER ISLAND HYDROLOGIC RESTORATION

ORIGINAL DATE: November 23, 1994
REVISED DATE: July 23, 1998

Preface

Pursuant to a CWPPRA Task Force decision on April 14, 1998, the original monitoring plan was increased in scope to conform with monitoring of projects of similar type. Specifically, shoreline change monitoring along the Phase II portion of the project area was added in years 2000, 2006, 2011 and 2016. Habitat Mapping was changed to analysis of the land to water ratio only, with two additional flights added in 2000 and 2011.

Project Description

Point au Fer Island lies approximately 6 mi (10 km) southeast of the mouth of the Atchafalaya River, which carries 30% of the combined flows of the Mississippi and Red rivers. The island is bordered by the Gulf of Mexico to the south, Atchafalaya Bay to the west, Fourleague Bay to the north and northeast, and Oyster Bayou tidal pass to the east. Salinities in this area can range from near 0 ppt at the northernmost reaches of the island to 25 ppt along the gulf side, and mean tidal amplitude is 1 ft (0.3 m) (Raynie 1991; Raynie and Shaw 1994.). Fourleague Bay (the northern boundary) is dynamic and generally carries a portion of the discharge from the Atchafalaya River, suggesting that sediment and nutrients should be readily available for flow into the northern reaches of Point au Fer island. Project PTE-22/24 is located on Point au Fer island and consists of two subunits (Area 1 and Area 2, figure 1).

The marsh habitat on the island is predominantly brackish marsh with intermediate marsh in the interior of the island. Saline marsh (predominately *Spartina alterniflora* [saltmarsh cordgrass] vegetation) exists along the southeastern and eastern border of the island. Along the west side of the Transco south canal (N-S canal in the southwest portion of the island, Area 1), the marsh is predominately *Spartina patens* (saltmeadow cordgrass). As a result of controlled burning, *Scirpus robustus* (salt-marsh bulrush) is also present. Other plant species present indicate a brackish marsh. The marsh along Locust Bayou is also brackish and is dominated by *S. patens* with traces of *S. alterniflora* (Everett 1994).

In recent years, certain areas of Point au Fer island have become weakened and avenues for saltwater intrusion from the Gulf of Mexico are threatening. The Mobil Canal levee (Area 2) was breached during Hurricane Andrew and the Transco Canal (Area 1) has almost breached into the Gulf of Mexico. This project is intended to reduce the potential for storm surges and high tides penetrating the canal in Area 1 and increasing the salinities in the surrounding marsh. This project also intends to prevent the repeated breaching of the shoreline and the ultimate connection of the Gulf of Mexico with the interior marsh near the Mobil Canal in Area 2.

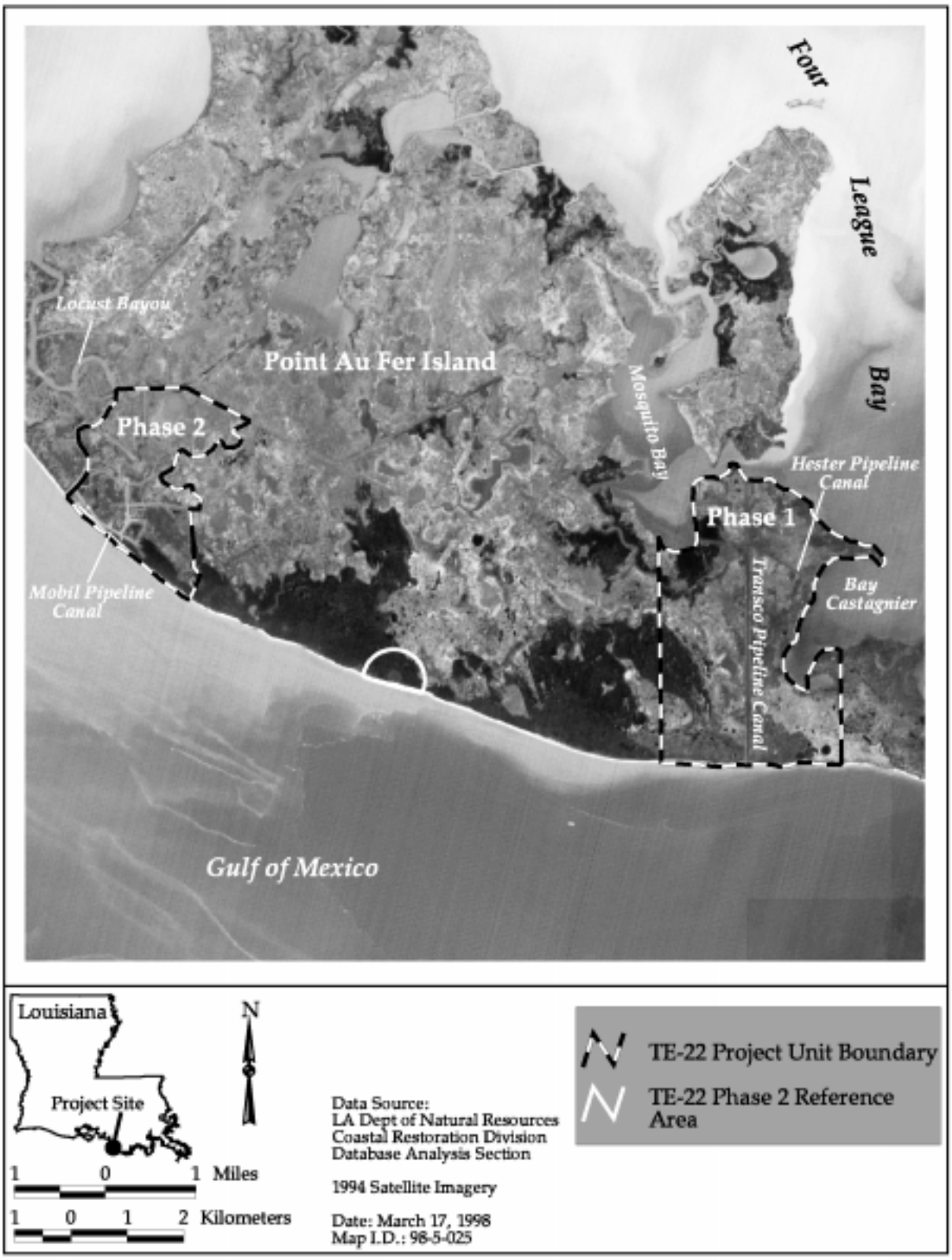

Figure 1 . Point Au Fer Hydrologic Restoration (TE-22) project area.

The project features include:

1. Construction of 4 earthen plugs in the canal connecting Mosquito Bay and Bay Canstagnier (Hester Canal, Area 1).

2. Construction of 3 earthen plugs in the north-south canal between Mosquito Bayou and the Gulf of Mexico (Transco Canal, Area 1).

3. Backfill a section of canal where breaching to the Gulf of Mexico has occurred (Area 2).

4. Backfill the dead end canal at the southern extent of Locust Bayou, which is threatening to breach into the Gulf of Mexico (Area 2).

Project Objectives

1. To reduce marsh loss and the potential for saltwater intrusion from storm surges and high tides (Area 1).

2. To restore hydrologic circulation close to historic conditions before access and pipeline canals were dredged (Area 1).

3. To reduce the chance of breaching between the Gulf of Mexico and access and pipeline canals during overwash events, consequently reducing the potential for interior marsh loss via shoreline breaching and beach overwashing (Area 2).

Specific Goals

The following goals will contribute to the evaluation of the above objectives:

1. Reduce the rate of marsh loss (Area 1).

2. Reduce the rate of canal widening (Area 1).

3. Maintain or decrease local shoreline erosion rate within the project area (Area 2).

Reference Area

An attempt was made to locate reference areas for this project by looking both on Point au Fer Island and along the coast between the Atchafalaya River and Isles Dernieres. A potential reference area was identified for area 2 (figure 1), however, an adequate reference could not be found for area 1.

A reference area should mimic the project area as closely as possible in the pre-construction condition and should not be affected by the project either during or after construction. The reference area can then be compared to the project area to identify project effects. Because we do not have an adequate reference for area 1, information collected from the project area before construction will be used to characterize the pre-construction condition. This information can then be compared to the post-construction information to identify differences between pre- and post-construction conditions as a result of the project.

The area identified as a potential reference for Area 2 is similar to Area 2 in that it has a narrow band of shoreline with open water behind it, making it susceptible to breaching by storm overwash. If this area breaches, it should provide an indication of what could have happened in area 2 without the project.

Monitoring Elements

The following monitoring elements will provide the information necessary to evaluate the specific goals listed above:

1. Aerial Photography — To document vegetated and non-vegetated areas (Areas 1 and 2), color-infrared aerial photography (1:24,000 scale, with ground controls) will be obtained. The photography will be georectified, by National Wetland Research Center, (NWRC) personnel according to the standard operating procedures described in Steyer et al. (1995). The photography will be obtained twice prior to construction in 1994 and 1997, and four times after construction in 2000, 2006, 2011, and 2016. DNR/CRD personnel will evaluate shoreline erosion in Area 1 where the canal will be backfilled from direct measurement and photo-interpretation. Estimates of marsh loss/gain and measurements of shoreline movement in Area 2 where the Gulf shoreline will be rip-rapped will be obtained from the combination of GPS measurement and aerial photography in 2000, 2006, 2011, and 2016.

2. Canal Width — To document the widening of canals, markers will be placed on each side of the canal(s) at a minimum of 2 locations within each canal (within 100 ft [30.5 m] of each plug in Area 1). Distance between vegetated edges of the canals will be directly measured between the markers in 1997, 2000, 2006, 2011 and 2016 (corresponding with aerial photography). These values will be compared with historical estimates of canal widening.

Anticipated Statistical Tests and Hypotheses

The following hypotheses correspond with the monitoring elements and will be used to evaluate the

accomplishment of the project goals.

1. Descriptive and summary statistics will be used on both historical data and data collected post-project implementation to assess changes in marsh loss/gain rates. Comparisons will also be made between marsh loss/gain between Area 2 and the reference area.

2. Descriptive and summary statistics will be used to compare measured rates of shoreline movement (ft/yr) within the project area (Area 2) between successive years, and to compare annual shoreline movement in the project area with that of the reference area (Area 2). Also, historical values (1956, 1978, 1984, 1990 GIS data) for the area as well as data available from other surveys (USACE, USFWS, LDNR, LSU) will be gathered to document and allow for statistical analysis of long-term shoreline movement along Point au Fer Island in the project area. When the H_0 is not rejected, possible negative effects will be examined. These tests will allow for the analysis and long-term documentation of shoreline changes on Point au Fer Island (goal 2). Data will be obtained from aerial photography.

   Hypothesis:

   H_0: After project implementation at year i, shoreline erosion rate will not be significantly different than at timepoint i-1.

   H_{a1}: After project implementation at year i, shoreline erosion rate will be significantly greater than at timepoint i-1.

   H_{a2}: After project implementation at year i, shoreline erosion rate will be significantly less than at timepoint i-1.

3. Descriptive and summary statistics will be used on both historical data and data collected post-project implementation to assess the rates of canal widening. These measured rates will be compared to pre-project rates and to expected "future without project" conditions.

NOTE: To aid in determining overall project success, available ecological data, both descriptive and quantitative, will be evaluated in concert with the statistical analyses as well as data available from other sources (USACE, USFWS, LDNR, LSU, etc.).

Notes

1.	Implementation:	Start Construction	October 10, 1995
		End Construction	May 8, 1997
2.	NMFS Point of Contact:	Thomas Minello	(409) 766-3506
		Terry McTigue	(318) 482-5915

3. DNR Project Manager: Brian Kendrick (504) 447-5057
DNR Project Manager: Mark Fugler (504) 447-0990
DNR DAS Assistant Chris Cretini (504) 342-9425

4. The twenty year monitoring plan development and implementation budget for this project is $112,833. A progress report will be available in May 1998, and comprehensive reports will be available in May 2001, May 2007, May 2012, and May 2017. These reports will describe the status and effectiveness of the project.

5. References:

Everett, L. 1994. Point au Fer Island Plugs TE-22. Unpublished report for the Louisiana Department of Natural Resources. Baton Rouge: Coastal Restoration Division. 3 pp.

Raynie, R. C. 1991. Study of the spatial and temporal ichthyoplankton abundance along a recruitment corridor from offshore to estuarine nursery. M. S. thesis. Baton Rouge: Louisiana State University. 116 pp.

Raynie, R. C., and R. F. Shaw 1994. Ichthyoplankton abundance along a recruitment corridor from offshore spawning to estuarine nursery ground. Estuarine, Coastal and Shelf Science (39): 421-450.

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson 1995. Quality management plan for coastal Wetlands Planning, Protection, and Restoration Act monitoring program. Open file series no. 95-01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.